The New Gold Standard for Lipoprotein Analysis
Cardiovascular Disease Mortality Trends for Males and Females

United States: 1979-2002

Source: CDC/NCHS.
Cholesterol Testing

Lipoprotein Groups

VLDL + LDL + HDL = Total Cholesterol

Normal Ranges:

10-30 + 50-100,130 + 50-100 = 100-200 mg/dL

Triglycerides/5 = VLDL

150 mg/dL / 5 = 30 mg/dL VLDL
Evolution of Lipoprotein Testing

“The Lipid Panel”

Total Cholesterol = \( VLDL + LDL + HDL \)

Friedewald Equation: \( VLDL = \frac{TG}{5} \)

Calculated LDL = TC – (HDL + TG/5)

Direct LDL is Better

Consensus Statement of the American Diabetes Assoc. & American College of Cardiology

Apo B 100 (est. of non-HDL Particles) is Better Yet

Lipoprotein Particles Predict Risk Better than Cholesterol

Lipoprotein Particle Numbers by Subgroup is Best
NCEP Guidelines for Cardiovascular Disease

NCEP - ATP III

- 50% of at Risk Individuals are Not Identified
- 50% of Heart Attack Victims have Normal Cholesterol
- NCEP Identified a Number of New Lipoprotein Risk Factors – To Help Assess Those at Risk
NCEP New Lipoprotein Risk Factors

- **RLP (Remnant Lipoprotein)**
  - High in 20% of population
  - One of the Most Atherogenic Lipoproteins
  - Skips Oxidation Step in Forming Plaque

- **Small Dense LDL** – High in 25% of population
  - 3-fold Greater Risk of CVD than Buoyant LDL
  - Penetrates Arterial Endothelial Lining Easily
  - Less Recognized by LDL Receptors therefore Increases

- **Lp(a)**
  - High in 20% of population
  - Small Particles that are Easily Oxidized
  - Competes with Plasminogen, Prevents Fibrinolysis

- **HDL 2b & 3** – Low in 20% of population
  - HDL 3 Picks Up Excess Cholesterol and Becomes HDL 2b in Reverse Cholesterol Transport
Lp(a) Competes with Plasminogen and Prevents Fibrinolysis

Many of the over 40 genetic variations of Lp(a) mimic plasminogen

Fibrinogen

Fibrin

Plasminogen

Plasmin

Lp(a)

Blood Clot (MI, Stroke or DVT)

Fibrinolysis

Possible Antithrombotic Therapy Indicated
Advanced Lipoprotein Testing

To Determine the NCEP New Risk Factors Lipoprotein Subgroup Information is Needed

What are Lipoproteins and their Subgroups?

How do they Cause Cardiovascular Disease?
Lipoprotein Particles

Apolipoprotein A-1 (HDL) or B-100 (LDL)

Cholesterol Ester

Unesterified Cholesterol

Triglyceride

Phospholipid
Atherogenic Particles

<table>
<thead>
<tr>
<th></th>
<th>VLDL</th>
<th>RLP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size   (nm)</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>Density (g/ml)</td>
<td>1.004</td>
<td>1.013</td>
</tr>
</tbody>
</table>

TG-rich Lipoproteins

Mean Endothelial Pore Size

<table>
<thead>
<tr>
<th></th>
<th>Buoyant LDL</th>
<th>Dense LDL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size   (nm)</td>
<td>22</td>
<td>19</td>
</tr>
<tr>
<td>Density (g/ml)</td>
<td>1.023</td>
<td>1.044</td>
</tr>
</tbody>
</table>
Atherosclerotic Plaque Formation

- HDL removes excess lipids.
- Arterial intima macrophage cell foam cells build plaque.
- Inflammation ruptures plaque.
- Arterial lumen dense LDL Lp(a) oxidized LDL.
- Monocyte cell
- Damaged endothelium cells
- Arterial intima macrophage cell

RLP
Why Have the LPP Test?

Provides a More Complete Risk Answer than the Standard Cholesterol Test

LPP Has Three Risk Identifying Components

1. NCEP’s New Lipoprotein Risk Factors
2. Lipoprotein Particle Numbers vs. Cholesterol Content
3. Non-Lipid Risk Factors: Lp-PLA₂, CRP, Insulin and Homocysteine

These Components Identify Many at Risk Individuals that are Missed
Lipoprotein Particle Profile (LPP™) Process

- Separates by Density using Analytical Ultracentrifugation

the CDC’s Gold Standard

- The New Gold Standard - Enhancements
- Continuous Gradient
- Clinically Relevant Lipoprotein Particles are Detected Not the Surrogate Marker Cholesterol
Lipoprotein Particle Measurement

Fluorescent Dye – a Phospholipid Analog

Fluorescent - Hydrophilic End  Hydrophobic End

When Hydrophobic End Imbeds into the Phospholipid Shell of the Lipoprotein the Hydrophilic End Fluoresces

The Fluorescence is a Direct Measurement of Particle Number
Separation by Density

Centrifuge Tube with Mixture of Serum, Gradient and Dye

Intense Gravitational Force
600,000 G’s

Density (g/ml)
1.000
1.006
1.030
1.063
1.100
1.300

Separated Lipoproteins

- VLDL
- LDL
- HDL
- Proteins
LPP Test - Lipoprotein Groups and Subgroups

Accurate Densities

Particle Measurement

HDL2b

HDL3

Approximate LDL

Particle Numbers, nmol/L

VLDL

Buoyant - Large

Dense - Small

HDL

Lipoprotein Particle Profile™

Risk Factor

Borderline

Normal

(R)LP

Triglycerides

VLDL

TDL

LDL

RLP

A

I

B

LDL Phenotype

1.006

1.019

1.023

1.034

1.044

1.056

1.063

1.070

1.100

1.200
LPP showing NCEP’s New Lipoprotein Risk Factors

Healthy Profile

Atherogenic Profile

<table>
<thead>
<tr>
<th>Lipoprotein Particle Numbers (nmol/L)</th>
<th>Value</th>
<th>Reference Value</th>
<th>Alert (Notes Page 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VLDL</td>
<td>29</td>
<td>&lt;115</td>
<td>Normal</td>
</tr>
<tr>
<td>LDL Total</td>
<td>715</td>
<td>&lt;190</td>
<td>Borderline High (6)</td>
</tr>
<tr>
<td>RLP (Remnant Lipoprotein)</td>
<td>40</td>
<td>&lt;155</td>
<td>Normal</td>
</tr>
<tr>
<td>Dense LDL II</td>
<td>102</td>
<td>&lt;300</td>
<td>Normal</td>
</tr>
<tr>
<td>Dense LDL IV and/or Lp(a)</td>
<td>79</td>
<td>&lt;125</td>
<td>Borderline High (6)</td>
</tr>
<tr>
<td>HDL Total</td>
<td>11676</td>
<td>&gt;7000</td>
<td>Very High (5)</td>
</tr>
<tr>
<td>Buoyant HDL 2b</td>
<td>3669</td>
<td>&gt;1800</td>
<td>Very High (5)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lipid Group and Non-Lipid Risk Factors</th>
<th>Value</th>
<th>Reference Value</th>
<th>Alert / Phenotype</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metabolic Syndrome Traits</td>
<td>0.8</td>
<td>6 to 7</td>
<td>Borderline</td>
</tr>
<tr>
<td>LDL Mean Density / Phenotype</td>
<td>1.031</td>
<td>&lt;1.035</td>
<td>Normal</td>
</tr>
<tr>
<td>HDL Mean Density</td>
<td>1.004</td>
<td>&lt;1.116</td>
<td>Normal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Cholesterol</th>
<th>Value</th>
<th>NCEP Value</th>
<th>Alert (Notes Page 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cholesterol</td>
<td>177</td>
<td>&lt;200</td>
<td>Above Optimal</td>
</tr>
<tr>
<td>LDL</td>
<td>96</td>
<td>&lt;100</td>
<td>Health Factor</td>
</tr>
<tr>
<td>HDL</td>
<td>73</td>
<td>&gt;49</td>
<td>Health Factor</td>
</tr>
<tr>
<td>Triglycerides (calculated)</td>
<td>47</td>
<td>&lt;150</td>
<td>Health Factor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Cholesterol</th>
<th>Value</th>
<th>NCEP Value</th>
<th>Alert (Notes Page 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cholesterol</td>
<td>29</td>
<td>&lt;200</td>
<td>Very High (5)</td>
</tr>
<tr>
<td>LDL</td>
<td>97</td>
<td>&lt;100</td>
<td>Low (6)</td>
</tr>
<tr>
<td>HDL</td>
<td>34</td>
<td>&gt;40</td>
<td>Low (6)</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>189</td>
<td>&lt;150</td>
<td>Borderline High (7)</td>
</tr>
</tbody>
</table>
Cholesterol Equivalent Concept

Aids in the Use of Particle Number Data

Direct Lipid Panel with Cholesterol Equivalents of Particle Numbers

The Average Patient TG’s ~75 – 125 mg/dL

Average Particle Size

Cholesterol Equivalents = Cholesterol Values

However Lipoproteins are Heterogeneous with Varying Cholesterol and Triglyceride Content
LPP Non-HDL Particle Numbers vs Apo B-100

Correlation of Apo B and LPP non-HDL Particle Numbers is Excellent

ADA and ACC Consensus: Apo B More Predictive of CVD Risk than Cholesterol*

One Apo B Molecule per non-HDL Particle

Correlation of Apo B and LPP non-HDL Particle Numbers is Excellent

* Diabetes Care, Volume 31, Number 4, April 2008

$r = 0.93$

$n = 2990$
Lipoprotein Particle Numbers

All of These Patients have the **Same LDL** “Cholesterol”

A
125 mg/dL

**Large - Buoyant Depleted**

TG’s & CETP

B
125 mg/dL

**Large - Buoyant**

Small - Dense Enriched

TG’s & CETP

C
125 mg/dL

**Small - Dense**

Depleted

D
125 mg/dL

**Small - Dense**

Depleted

Particle Numbers or Apo B-100

Low

Increased

Increased

High

Risk
Cholesterol Depleted Profile

Chemistry

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>NCEP Value</th>
<th>Alert (Notes Page 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cholesterol</td>
<td>226</td>
<td>&lt;200</td>
<td>Borderline High (1)</td>
</tr>
<tr>
<td>LDL</td>
<td>135</td>
<td>&lt;100</td>
<td>High (4)</td>
</tr>
<tr>
<td>HDL</td>
<td>43</td>
<td>&gt;40</td>
<td></td>
</tr>
<tr>
<td>Triglycerides</td>
<td>178</td>
<td>&lt;150</td>
<td>Borderline High (7)</td>
</tr>
</tbody>
</table>

LPP - CEQ

191  TC  226
LDL  112  LDL  135
HDL  39  HDL  43

No LDL Treatment

Treat LDL

High VLDL and TG’s

CETP exchanges cholesterol for triglycerides
## Cholesterol Enriched Profile

### Direct Lipid Panel - Cholesterol Equivalent of Lipoprotein Particle Numbers (mg/dL)

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>NCEP Value</th>
<th>Alert (Notes Page 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cholesterol</td>
<td>152</td>
<td>&lt;200</td>
<td></td>
</tr>
<tr>
<td>LDL</td>
<td>81</td>
<td>&lt;100</td>
<td>Above Optimal</td>
</tr>
<tr>
<td>HDL</td>
<td>68</td>
<td>&gt;40</td>
<td>Health Factor</td>
</tr>
<tr>
<td>Triglycerides (calculated)</td>
<td>36</td>
<td>&lt;150</td>
<td></td>
</tr>
</tbody>
</table>

*may not be directly comparable to lipid values from other methods*

### Chemistry LPP- CEQ

- **TC**: 193 (152)
- **LDL**: 93 (81)
- **HDL**: 78 (68)

**HDL is over estimated**

**Low VLDL and RLP**

Low triglyceride content of lipoproteins replaced by additional cholesterol
Relevance of Lipoprotein Particle Numbers

- A Disconnect Exist between Lipoprotein Particle Number and Cholesterol Number
- 30% of the Population is Cholesterol Depleted
- 20% of the Population is Cholesterol Enriched
- The LPP Test is Like Having Apo B-100 Broken Down into Subgroups for a Better Therapeutic Approach
The Magnitude of the Result is Easy to Judge with Respect to the Reference Value

Color Highlighted Numerical Results
# Test Report Page 2

## Primary Risk Assessment

**Direct Lipid Panel in Cholesterol Equivalents**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>NCEP Value</th>
<th>Alert (Notes Page 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cholesterol - CEQ</td>
<td>220</td>
<td>&lt;200</td>
<td>Borderline High (1)</td>
</tr>
<tr>
<td>LDL - CEQ</td>
<td>139</td>
<td>&lt;130</td>
<td>High (4)</td>
</tr>
<tr>
<td>HDL - CEQ</td>
<td>63</td>
<td>&lt;60</td>
<td>Borderline Low (2)</td>
</tr>
<tr>
<td>Triglycerides (mg/dL)</td>
<td>135</td>
<td>&lt;150</td>
<td>Borderline Low (3)</td>
</tr>
</tbody>
</table>

Results for serum Total Cholesterol, LDL, and HDL as measured in mg/dL may be different than results for Total Cholesterol, LDL, and HDL as measured in mmol/L.

## Risk Modification

**Graph – Quick Assessment**

### Risk Modification

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Reference Value</th>
<th>Alert (Notes Page 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metabolic Syndrome Traits</td>
<td>0.8</td>
<td>0 to 3</td>
<td>None (10)</td>
</tr>
<tr>
<td>Lp-PLA2 (mg/dL)</td>
<td>240</td>
<td>&lt;260</td>
<td>Borderline (11)</td>
</tr>
<tr>
<td>C-Reactive Protein-ss (mg/dL)</td>
<td>0.30</td>
<td>&lt;0.40</td>
<td>Borderline Low (12)</td>
</tr>
<tr>
<td>Insulin (uIU/mL)</td>
<td>11.2</td>
<td>&lt;5.6</td>
<td>Borderline Low (13)</td>
</tr>
<tr>
<td>Homocysteine (uIU/mL)</td>
<td>41.3</td>
<td>&lt;15.0</td>
<td>Borderline High (14)</td>
</tr>
</tbody>
</table>

## Therapeutic Approach

### Therapeutic Approach Assessment

<table>
<thead>
<tr>
<th>Lipoprotein Particle Numbers (nmol/L)</th>
<th>Value</th>
<th>Reference Value</th>
<th>Alert (Notes Page 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VLDL</td>
<td>199</td>
<td>&lt;115</td>
<td>High (16)</td>
</tr>
<tr>
<td>LDL Total</td>
<td>1976</td>
<td>&lt;900</td>
<td>Borderline Low (17)</td>
</tr>
<tr>
<td>PLP (Preminant Lipoprotein)</td>
<td>145</td>
<td>&lt;130</td>
<td>High (18)</td>
</tr>
<tr>
<td>Dense LDL III</td>
<td>237</td>
<td>&lt;380</td>
<td>Borderline Low (19)</td>
</tr>
<tr>
<td>Dense LDL IV</td>
<td>90</td>
<td>&lt;190</td>
<td>Borderline Low (20)</td>
</tr>
<tr>
<td>HDL Total</td>
<td>8147</td>
<td>&gt;7000</td>
<td>Borderline Low (21)</td>
</tr>
<tr>
<td>Buoyant HDL 2d</td>
<td>1461</td>
<td>&gt;1480</td>
<td>Borderline Low (22)</td>
</tr>
</tbody>
</table>

### Additional Lipoprotein Risk Factors

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Reference Value</th>
<th>Alert / Phenotype</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDL Mean Size (nm) / Phenotype</td>
<td>20.21</td>
<td>&gt;20.20</td>
<td>Large LDL Type A (23)</td>
</tr>
<tr>
<td>Lp(a) (mg/dL)</td>
<td>65.0</td>
<td>&gt;50.0</td>
<td>High (24)</td>
</tr>
</tbody>
</table>

## LPP+ Includes

- Lp-PLA2
- C-Reactive Protein
- Insulin
- Homocysteine

### Therapeutic Approach

- **Direct Measurement of Lipoprotein Particle Numbers, Lp(a) and LDL Size**
Prevalence of the NCEP Metabolic Syndrome: NHANES III by Age

<table>
<thead>
<tr>
<th>Age, years</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>20–29</td>
<td>24%</td>
<td>8%</td>
</tr>
<tr>
<td>30–39</td>
<td>8%</td>
<td>6%</td>
</tr>
<tr>
<td>40–49</td>
<td>23%</td>
<td>24%</td>
</tr>
<tr>
<td>50–59</td>
<td>44%</td>
<td>44%</td>
</tr>
<tr>
<td>60–69</td>
<td>44%</td>
<td>44%</td>
</tr>
<tr>
<td>≥70</td>
<td>44%</td>
<td>44%</td>
</tr>
</tbody>
</table>

Interrelation Between Atherosclerosis and Metabolic Syndrome - Insulin Resistance

**Six Possible Traits**
- Hypertension
- Obesity
- High Glucose
- High Triglycerides
- Small, Dense LDL
- Low HDL
The Role of CETP and TG’s in Metabolic Syndrome

Atherogenic Profile with High TG’s, Low HDL and Dense LDL. Patient has *Metabolic Syndrome*

Three Lipid Traits is a Probable Diagnosis of Metabolic Syndrome

Most Likely the Patient has One or More non-Lipid Traits:
1. Hypertension
2. Obesity
3. High glucose

Risk Level Increases

Check for *Insulin Resistance*
The role of Lp-PLA₂ in plaque formation

- Lp-PLA₂
- Oxidized LDL
- Lyso-PC
- OxFAs
- Monocytes
- Adhesion molecules
- Cytokines
- Macrophage
- Foam Cell
Primary Risk Assessment from Direct Lipid Panel with Cholesterol Equivalents

Modify Risk Level Using Metabolic Syndrome Traits Lp-PLA$_2$, CRP and Insulin

Direct Therapeutic Approach Based on LDL and HDL Subgroup Distributions and Lp(a)
Important Benefits of the LPP™ Test

- Identification of the NCEP New Risk Factors
- Measurement of Lipoprotein Particles Numbers with Lipid Panel in Cholesterol Equivalents
- Identification of Lipid Metabolic Syndrome Traits
- LPP+ Adds Inflammation Risk Factors Lp-PLA$_2$ and CRP plus Insulin and Homocysteine
Male Patient on 20 mg of Atorvastatin for 3 Years changing to 10 mg Rosuvastatin for two months

Both LDL and HDL Reduced Small-Dense Particles to More Buoyant Positions at about the Same Statin Level

### Therapeutic Approach Assessment

<table>
<thead>
<tr>
<th>Lipoprotein Particle Numbers (nmol/L)</th>
<th>Value</th>
<th>Reference Value</th>
<th>Alert (Notes Page 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VLDL</td>
<td>143</td>
<td>&lt;115</td>
<td>Borderline High (10)</td>
</tr>
<tr>
<td>LDL Total</td>
<td>561</td>
<td>&lt;900'</td>
<td>Borderline High (12)</td>
</tr>
<tr>
<td>LDL I &amp; II</td>
<td>123</td>
<td>&lt;150</td>
<td>Borderline High (12)</td>
</tr>
<tr>
<td>LDL IV</td>
<td>152</td>
<td>&lt;300</td>
<td>Health Factor</td>
</tr>
<tr>
<td>Dense LDL I &amp; II</td>
<td>144</td>
<td>&lt;300</td>
<td>Health Factor</td>
</tr>
<tr>
<td>Dense LDL IV</td>
<td>66</td>
<td>&lt;100</td>
<td>Health Factor</td>
</tr>
<tr>
<td>HDL Total</td>
<td>10392</td>
<td>&gt;7000</td>
<td>Health Factor</td>
</tr>
<tr>
<td>Buoyant HDL 2b</td>
<td>1880</td>
<td>&gt;1400</td>
<td>Health Factor (17)</td>
</tr>
</tbody>
</table>
**Bile Sequestrant Therapy**

**3000 mg Niaspan for 4 months**

- HDL increased from 38 to 44
- LDL No Change
- TG’s decreased from 213 to 173

**3750 mg Welchol for 4 months**

- LDL decreased from 132 to 79 (40%)
- RLP 54%
- LDL I & II 24%
- LDL III 55%
- LDL IV 34%
- TG’s decreased from 213 to 173 (45%)
Male Patient on 4 gm EPA & DHA Omega-3’s, adding 10 mg Rosuvastatin and then 145 mg Tricor

**Primary Risk Assessment**

<table>
<thead>
<tr>
<th>Sample Date &amp; Profile Color</th>
<th>Triglycerides (mg/dL)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>182 145 57</td>
</tr>
</tbody>
</table>

LDL Decreased (48%)

**Risk Modification**

<table>
<thead>
<tr>
<th>Metabolic Syndrome Traits</th>
<th>Reference Value</th>
<th>Alert (Notes Page 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lp - PLAS (ng/mL)</td>
<td>64</td>
<td>&lt;200</td>
</tr>
<tr>
<td>C-Reactive Protein-ss (mg/dL)</td>
<td>0.19 0.21</td>
<td>&lt;6.40</td>
</tr>
<tr>
<td>Lp(a) (mg/dL)</td>
<td>13.5</td>
<td>&lt;11.0</td>
</tr>
</tbody>
</table>

**Therapeutic Approach Assessment**

<table>
<thead>
<tr>
<th>Lipoprotein Particle Numbers (mmol/L)</th>
<th>Value</th>
<th>Reference Value</th>
<th>Alert (Notes Page 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VLDL</td>
<td>53</td>
<td>49.0 48.0</td>
<td>&lt;85</td>
</tr>
<tr>
<td>LDL Total</td>
<td>407</td>
<td>195 195</td>
<td>&lt;150</td>
</tr>
<tr>
<td>Lp(a) (mg/dL)</td>
<td>79</td>
<td>56.5</td>
<td>&lt;30.0 5</td>
</tr>
</tbody>
</table>

145 mg Tricor

**TG’s decreased 57%**

**Dense LDL Decreased 29%**

**Metabolic Syndrome Traits from 2 to 0**
New Lipoprotein

Apo C-1 Enriched HDL

Identified with the LPP Test

Apo C-1 HDL Cord Blood Study by Johns Hopkins and Texas A&M University*

Examples of the Atherogenic Apo C-1 Enriched HDL and Low Birth Weight Babies (~6 lb vs ~7 lb)*

Apo C-1 HDL Characteristics Observed in 1-2% of Specimens

Proinflammatory HDL Associated with Endothelial Dysfunction

62 year old female MD with a healthy profile like shown found that her calcium score was in the 90th percentile

Apo C-1 HDL at d = 1.06

Low TG’s, VLDL and RLP
# Lipoprotein Particle Numbers
## Therapeutic Guidelines

<table>
<thead>
<tr>
<th>Lipoprotein</th>
<th>Therapeutic Life Style Changes (diet &amp; exercise)</th>
<th>Statins</th>
<th>Niacin</th>
<th>Fibrates</th>
<th>Estrogens</th>
<th>Resins</th>
<th>Absorption Inhibitors</th>
<th>Omega-3’s EPA &amp; DHA</th>
<th>Alcohol</th>
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<tbody>
<tr>
<td>VLDL (Triglycerides)</td>
<td>♥ ♥ ♥ ♥♥ X X ♥ ♥♥</td>
<td>♥ ♥ ♥ ♥♥ X X ♥ ♥♥</td>
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<tr>
<td>RLP (IDL)</td>
<td>♥ ♥ ♥ ♥ ♥ X X ♥ ♥♥</td>
<td>♥ ♥ ♥ ♥♥ X X ♥ ♥♥</td>
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<td>LDL I &amp; II - buoyant</td>
<td>♥ ♥ ♥ ♥♥ X X ♥ ♥♥</td>
<td>♥ ♥ ♥ ♥♥ X X ♥ ♥♥</td>
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<tr>
<td>LDL III - dense</td>
<td>♥ ♥♥ ♥♥♥ ♥♥♥</td>
<td>♥ ♥♥ ♥♥♥ ♥♥♥</td>
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<td>LDL IV or Lp(a)</td>
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<tr>
<td>HDL 2b - buoyant</td>
<td>♥♥♥</td>
<td>♥♥♥</td>
<td>♥♥♥</td>
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<tr>
<td>HDL 2a &amp; 3</td>
<td>♥♥♥</td>
<td>♥♥♥</td>
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</tbody>
</table>

- ♥♥ Theraupetic
- ♥ Beneficial
- □ Little or No Effect
- X Negative Result

*These guidelines provide some of the treatment options available to modify lipoprotein particle numbers determined by the LPP™ test.

**Spectracell Laboratories observed response to treatment.

The National Cholesterol Education Program (NCEP) guidelines provide dosage information on the treatment options.